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PATENT

REMARKS

Claims 1-21 were originally filed in the present application.

Claims 1, 9 and 17 were previously cancelled.

Claims 22-24 were previously added.

Claims 2-8, 10-16, and 18-24 are pending in the present application.

Claims 2-8, 10-16, and 18-24 were rejected in the May 5, 2005 Office Action.

Claims 2, 10 and 18 are amended herein in order to more particularly point out and distinctly claim the Applicant's invention.

Claims 2-8, 10-16, and 18-24 remain in the present application. Reconsideration of the claims is respectfully requested.

In Sections 2 and 3 of the May 5, 2005 Office Action, the Examiner rejected Claims 2-8, 10-16 and 18-24 under 35 U.S.C. §103(a) as being unpatentable over United States Patent No. 5,926,816 to *Bauer et al.* (hereafter, simply "*Bauer*") in view of the article "A Formal Approach to Recovery by Compensating Transactions", *Levy et al.*, Proceedings of the 16th VLDB Conference, 1990, pp. 95-106 (hereafter, simply "*Levy*").

Regarding independent Claims 2, 10 and 18, the Examiner asserted that the *Bauer* reference disclosed substantially all of the limitations of Claims 2, 10 and 18, with the exception that the *Bauer* reference does not explicitly disclose "the limitation of the server and client operating substantially concurrently". The Examiner further asserted, however, that Figures 6A and 6B of the *Bauer* reference and the text at column 4, lines 40-55, and column 11, line 23, to column 13, line 60, teach

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that proper synchronization should be frequently verified in the communication between client and server. Thus, according to the Examiner, the limitation regarding the server and client operating substantially concurrently is therefore inherent.

The Examiner further asserted that, even if the *Bauer* reference falls short, the *Levy* reference nonetheless discloses the missing limitation regarding the server and client operating substantially concurrently. In particular, the Examiner asserted that the *Levy* reference discloses "a compensating transaction system that has some special characteristics such as concurrently executing transactions in order to conform consistency constraints (See *Levy*, Section 2, Overview of Compensation, pg. 96). The Examiner concluded that it would have been obvious to combine the *Bauer* reference and the *Levy* reference to arrive at the claimed invention.

The Applicant respectfully disagrees with the Examiner's rejections of Claims 2-8, 10-16 and 18-24 and directs the Examiner's attention to Claim 2, which recites the unique and non-obvious limitations emphasized below:

2. A data synchronization apparatus for maintaining synchronization between a source data file and a copy data file comprising:
a bulk copy controller capable of copying a plurality of data records from said source data file to said copy data file during a first copy operation; and
an update controller capable of detecting a change in a data record previously copied by said bulk copy controller from said source data file to said copy data file during said first copy operation and copying said changed data record from said source data file to said copy data file, wherein said update controller copies said changed data record while said bulk copy controller is performing said first copy operation. (emphasis added)

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The Applicant respectfully asserts that the above-emphasized limitations are not disclosed, suggested, or even hinted at, in the *Bauer* reference or the *Levy* reference, or in the combination of the *Bauer* reference and the *Levy* reference.

The Applicant respectfully disagrees with numerous statements made by the Examiner in the first paragraph on page 2 of the Office Action regarding the client computer and the server computer.

The Examiner seems to be stating (or at least implying) that the client computer and the server computer of the *Bauer* reference each comprise both a bulk copy controller and an update controller, or, alternatively, that one of them is the bulk copy controller and the other is the update controller. In support of this, the Examiner cites the text of the *Bauer* reference at column 9, lines 35-49, column 2, lines 4-20, and column 8, lines 3-45.

The Applicant notes that the invention in Claim 2 uses two distinct controllers (i.e., a bulk copy controller and an update controller) to synchronize a source data file and a copy data file. The bulk copy controller copies data records from the source data file to the copy data file during a first copy operation. While this first copy operation is occurring, the update controller detects changes in data records in the source data file that were already copied during the first copy operation and copies the changed data records over to the copy data file, while the bulk copy controller is still performing the first copy operation. Thus, by the time the bulk copy controller finishes the first copy operation, the update controller will already have copied over data records that changed in the source data file while the first copy operation was still underway. This maintains closer synchronization between the

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source data file and the copy data file, especially if the first copy operation requires a large amount of time to perform.

The Applicant notes that the server computer and the client computer described in the *Bauer* reference use separate synchronization processes. However, the synchronization process in the server computer operates only in the server node and the synchronization process in the client node operates only in the client node. The Applicant directs the Examiner's attention to the text of the *Bauer* reference relied upon by the Examiner in column 9, lines 35-49, wherein it states:

Referring to FIG. 5A, the server database synchronization is initiated by a particular source client node 20x. The client propagates modifications of the client table Tc to the server by determining what has changed in the client table Tc since the last time modifications were propagated for the client table Tc. At step 105 the client adds each row of the before-image log table Tb to a checksum that is accumulated for later use. The source client node 20x does a row comparison between the client table Tc and the associated before-image log table Th by querying each table at step 110. If there is a difference (step 115), then there has been an insertion, an update or a deletion of data fields in the row.

The use of a before-image is only one way of detecting modifications at the client. The client can use one of many other methods for determining the modifications since the last synchronization. These other methods can include, but are not limited to, DBMS logging and application logging to create a client update log table similar to the server update log table Tu. To be general purpose and compatible with heterogeneous database products, the database synchronizer requires a general purpose technique. Because many commercially available client database products currently lack logging capabilities, a preferred embodiment of the invention employs the before-image technique. (emphasis added)

The Applicant respectfully submits that the *Bauer* reference makes clear that the client node uses a single synchronization operation that compares the current image of the table with the before-image of the table and transmits only the changed data (i.e., the changes since the last synchronization).

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This process is repeated over and over in order to maintain synchronization. There is no second synchronization process that operates at the same time as the first synchronization process.

Thus, the *Bauer* reference fails to disclose a bulk controller that copies data records from the source data file to the copy data file in a first copy operation (without regard to whether the data records have changed from a previous time) and an update controller that updates data records that change in the source data file while the bulk copy controller is still performing the first copy operation.

Moreover, the Applicant again disagrees with the Examiner's assertions regarding the subject matter disclosed in the *Levy* reference. The Applicant respectfully asserts that the *Levy* reference does not disclose or even hint at the Claim 2 limitation that the update controller copies changed data records while the bulk copy controller is still performing the first copy operation.

The Applicant again asserts that the portion of the *Levy* reference relied upon by the Examiner appears to be wholly unrelated to such a limitation. The first two paragraphs of Section 2, "Overview of Compensation," of the *Levy* reference state:

When the updates of a (committed or uncommitted) transaction *T* are read by some other transaction, we say that *T* has been externalized. The sole purpose of compensation is to handle situations where we want to undo an externalized transaction *T*, without resorting to cascading aborts. We refer to *T* as the compensated-for transaction. The transactions that are affected by (reading) the data values written by *T* are referred to as dependent transactions (of *T*), and are referred to as a set using the notation $\text{dep}(T)$. The key point of our recovery paradigm is that we would like to leave the effects of the dependent transaction intact while preserving the consistency of the database, when undoing the compensated-for transaction. Compensation undoes *T*'s effects in a semantic manner, rather than by physically restoring a prior state. All that is guaranteed by compensation is that a

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consistent state is established based on semantic information. This state may not be identical to the state that would have been reached, had the compensated-for transaction never taken place.

We propose the notion of compensating transactions as the vehicle for carrying out compensation. We use the notation *CT* to denote the compensating transaction for transaction *T*. A compensating transaction has the fundamental properties of a transaction along with some special characteristics. It appears atomic to a concurrently executing transactions (that is, transactions do not observe partially compensated states); it conforms to consistency constraints; and its effects are durable. However, a compensating transaction is a very special type of transaction. Under certain circumstances, it is required to restore consistency, rather than merely preserve it. It is durable in the strong sense that once a decision is made to initiate compensation, the compensating transaction must complete, since it does not make any sense to abort it. The choice of either to abort or to commit is present for the original transaction. A compensating transaction offers the ability to reverse this choice, but we do not go any further by providing the capability to abort the compensation. There are other special characteristics. Above all, a compensating transaction does not exist by its own right; it is always regarded within the context of the compensated-for transaction. It is always executed after the compensated-for transaction. Its actions are derivative of the actions of the compensated-for and the dependent transactions. In some situations, the actions of a compensating transaction can be extracted automatically from the program of the compensated-for transaction, the current state of the database, and the current state of the log. In other situations, it is the system programmer's responsibility to pre-define a compensating transaction (emphasis added).

The Examiner summarizes the foregoing (particularly the emphasized text) by stating that "*Levy* discloses a compensating transaction system that has some special characteristics such as concurrently executing transaction in order to confirm consistency constraints." The Applicant is unsure what the Examiner means by this statement and has no idea how this statement is related to the unique and non-obvious limitations in Claim 2.

Moreover, the Examiner's summarization appears to be incorrect. The *Levy* reference actually states that the "compensating transaction has the fundamental properties of a transaction

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along with some special characteristics". These special characteristics are: 1) the compensating transaction appears atomic to a concurrently executing transactions (that is, transactions do not observe partially compensated states); 2) the compensating transaction conforms to consistency constraints; and 3) the effects of the compensating transaction are durable. And, again, the Applicant has no idea how this is related to the limitations in Claim 2. The Applicant respectfully asserts that the compensation process described above has nothing to do with the limitations recited in Claim 2.

This being the case, Claim 2 presents patentable subject matter over the *Bauer* reference and the *Levy* reference, either individually or in combination. Also, Claims 3-8 depend from Claim 2 and contain all of the unique and non-obvious limitations recited in Claim 2. This being the case, Claims 3-8 are patentable over the *Bauer* reference and the *Levy* reference, either individually or in combination.

Furthermore, independent Claims 10 and 18 recite limitations that are analogous to the unique and non-obvious limitations recited in Claim 2. Claims 10 and 18 are therefore patentable over the cited prior art references. Finally, Claims 11-16, which depend from Claim 10, and Claims 19-24, which depend from Claim 18, contain all of the unique and non-obvious limitations recited in Claims 10 and 18, respectively. This being the case, Claims 11-16 and Claims 19-24 are patentable over the *Bauer* reference and the *Levy* reference, either individually or in combination.

The Applicant also disagrees with the Examiner's assertions regarding the subject matter disclosed in the *Bauer* reference and the *Levy* reference with respect to the individual limitations recited in dependent Claims 3, 11 and 19, dependent Claims 4, 12 and 20, dependent Claims 5, 13

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and 21, dependent Claims 6 and 14, dependent Claims 7-8 and 15-16, dependent Claim 22, and dependent Claims 23-24. Although the Applicant's argument that the dependent claims are allowable because they depend from allowable independent claims has rendered moot the Examiner's rejection of individual dependent claims, the Applicant will nonetheless point out at least some of the inaccurate comparisons made by the Examiner between the subject matter disclosed in the *Bauer* and *Levy* references and the limitations recited in the dependent claims.

By way of example, the rows and columns of data and the update log in the *Bauer* reference are not analogous to the synchronization descriptor associated with each data table of data records in Claim 3. In another example, the catalogs of the client and server manifest table correspondences disclosed in the *Bauer* reference are not analogous to the Claim 4 limitation that the bulk copy controller sequentially copies data records from the data table in the source data file to the copy data file and sets the synchronization descriptor to an index value of a most recently copied one of the plurality of data records. Other examples abound. However, it is sufficient for now to point out the foregoing discrepancies and await further clarification by the Examiner of the relevance of the *Bauer* and *Levy* references to the limitations recited in the dependent claims.

To expedite the prosecution of the present application, it is suggested that the Examiner call the undersigned at (972) 628-3649 if the Examiner requires any further clarification concerning the differences between the limitations recited in the claims of the present application and the subject matter in the *Bauer* and *Levy* references.

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SUMMARY

For the reasons given above, the Applicant respectfully requests reconsideration and allowance of pending claims and that this Application be passed to issue. If any outstanding issues remain, or if the Examiner has any further suggestions for expediting allowance of this Application, the Applicant respectfully invites the Examiner to contact the undersigned at the telephone number indicated below or at *jmockler@davismunck.com*.

The Commissioner is hereby authorized to charge any additional fees connected with this communication or credit any overpayment to Deposit Account No. 50-0208.

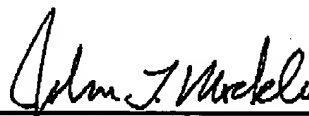
Respectfully submitted,

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